

Johnson Space Center

Task

Development of IR Contrast Data Analysis Application for Characterizing Delaminations in Graphite-Epoxy Structures

Center Point of Contact

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Objective

Develop infrared (IR) flash thermography application based on use of a calibration standard for inspecting graphite-epoxy laminated/honeycomb structures.

Background

Graphite/Epoxy composites (laminated and honeycomb) are widely used on NASA programs. Composite materials are susceptible for impact damage that is not readily detected by visual inspection. IR inspection can provide required sensitivity to detect surface damage in composites during manufacturing and during service. IR contrast analysis can provide characterization of depth, size and gap thickness of impact damage.

Benefits/Payoffs

The research provides an empirical method of calibrating the flash thermography response in nondestructive evaluation. A physical calibration standard with artificial flaws such as flat bottom holes with desired diameter and depth values in a desired material is used in calibration. The research devises several probability of detection (POD) analysis approaches to enable cost effective POD study to meet program requirements.

Recent Accomplishments

A calibration sample was fabricated. The standard was used to obtain the Flash IR Thermography response. Subsequently the data was used to create a calibration file. The file is used in interpretation of the IR signal response for flaw size and depth.

Current Activities

Matlab routines are being devised to provide graphical user interface for creating calibration data and to interpret IR signal response using the calibration data.

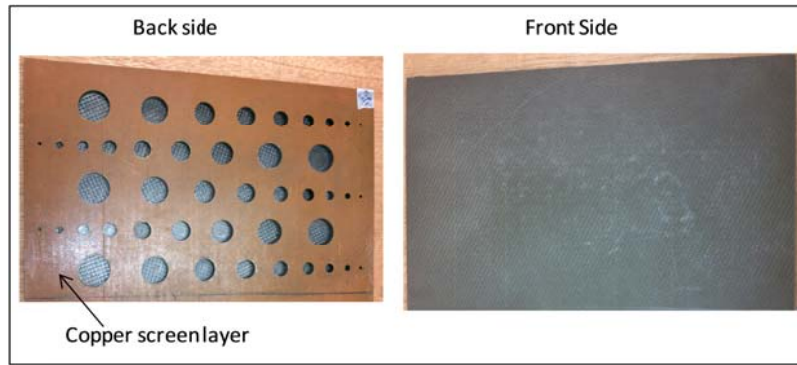


Fig. 1: Photos of the Graphite-Epoxy Standard

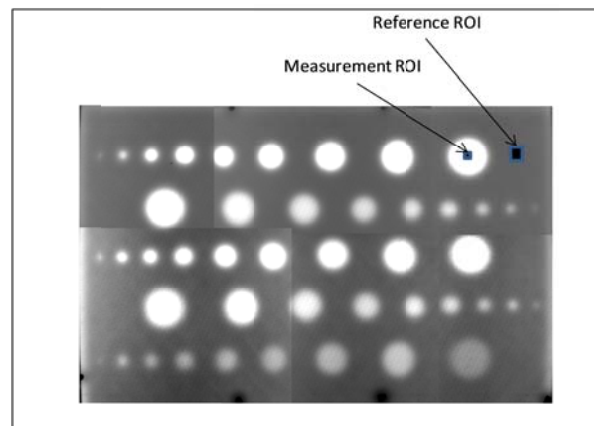


Fig. 5: An IR Image of the Calibration Standard from Raw Data